FLEXIBLE VEHICLE GUIDING ELEMENT

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] This invention relates to guiding elements for toy vehicles and more specifically to a flexible vehicle guiding element formed from molded elastomeric material which is bendable in a multiplicity of axes and will retain the form into which it is bent.

Prior Art

[0002] In the field of vehicle guiding elements particularly such as tracks or toy trains, it has been customary to provide track sections made of wood which are interconnected at each end of a segment by appropriate elements. In some instances the track segments are held together by a cable extending through an opening provided therein. To take care of such prior art tracks are those shown in U.S. Patents 3,013,726; 5,779,145; 5,979,738; and 6,398,121. Such structures while functioning to provide a vehicle guiding system are generally rigid artwork connected by cables are limited in the amount of curvature that is required and where the track is to traverse hill sections. The rigidity imposes undesirable complications insofar as the interconnections of the segments are concerned as well as the ability to provide the configuration desired by the user in a simple and easy impression.

[0003] To solve some of these problems various configurations of molded track sections have been produced which allow more flexibility by providing a great multiplicity of independent small sections which have interlocking engagements there between to allow the track to extend and/or contract as well as to bend not only to provide a curvature but also to provide the ability to ascend or descend the examples of such structures are shown in U.S. Patents 3,750,945; 4,540,119; 4,544,094 and RE. 30454. Tracks formed from these segments function well but still suffer from the inadequacies of maintaining the desired position for the track during use particularly when placing the track in an ascending or descending position. Under these circumstances, it is often required that some special support mechanism be utilized to hold the track in the desired position.

[0004] The closest prior art known to applicant is illustrated in U.S. Patents 4,397,419 and 5,678,489. The 4,397,419 patent discloses a vehicle guiding element in the form of a track for a toy vehicle which is molded from a synthetic plastic material. A wire band of angular cross-section constituted of a soft and thereby easily bendable metal used and inserted into slots formed in the molded plastic body. The wire bands conduct electricity to the toy vehicle and at the same time allow the toy vehicle track to be bent into a plurality of different curved shapes. The structure disclosed in the 5,678,489 patent is an electrically operated vehicle which is travelling on a rail which is formed of a plurality of molded plastic segments interlocked together. The segments have channels formed in the top and bottom thereof. Wires which are used to conduct the electrical current are secured by appropriate clips into the channels. The wires permit all of the segments of the track to be connected in series and permit the track to be curved and twisted and turned. The vehicle guiding systems as disclosed in each of Patents 4,397,419 and 5,678,489 although providing a flexibility are constructed such that the wires or wire bands are exposed and must be inserted into appropriate slots or connectors for the track to function properly.

SUMMARY OF THE INVENTION

[0005] A flexible guiding element for toy vehicles which is constructed of a plurality of segments. Each of the segments comprises a body formed of a molded elastomeric material with a ductile metal member encased within the body in direct contact with and surrounded by the elastomeric material.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] Figure 1 is an isometric view of one segment of the flexible vehicle guiding element constructed in accordance with the principles of the present invention;
Figure 2 is a top plan view of the segment as shown in Figure 1;

Figure 3 is a cross-sectional view taken about the lines 3-3 of Figure 2;

Figure 4 is a detailed view of relief sections taken about the section 4 of Figure 2;

Figure 5 is a detailed view taken about the segment 5 of Figure 2 illustrating the female receptacle connector;

Figure 6 is a bottom plan view of the segment shown in Figure 1;

Figure 7 is a partial view of two segments interconnected together for the utilization of appropriate male and female connectors;

Figure 8 illustrates the male connector end of a flexible segment of the present invention connected to a female end of a rigid or wooden guiding element of the prior art;

Figure 9 is similar to Figure 8 but illustrates the male connector of a typical rigid or wooden prior art segment connected to a flexible female connector of the segment of the present invention;

Figure 10 is an isometric view illustrating the manner in which a flexible vehicle guiding element and constructed in accordance with the present invention maybe shaped in a multiplicity of axes;

Figure 11 is an isometric view of a merged/switched vehicle guiding element segment constructed in accordance with the principles of the present invention;

Figures 12, 13, 14 and 15 illustrate an alternative embodiments of track segments, each having a different form of embedded ductile metal member encased therein;

Figure 16 is an isometric drawing of a connector which may be utilized to provide additional stability to interconnected segments of a flexible vehicle element constructed in accordance with the principles of the present invention;

Figure 17 shows the connector stowed on the bottom of a segment;

Figure 18 illustrates a track segment as shown in Figure 17 turned so that the top surface is shown; and

Figure 19 shows the connector in position and affixed to the end of the segment at the female connector end ready for receipt of the male connector end.

DETAILED DESCRIPTION

[0007] Referring now more particularly to Figure 1, there is illustrated a segment 10 of a flexible vehicle guidance element constructed in accordance with the present invention. The segment 10 includes a body 12 constructed of a molded elastomeric material. Various elastomeric materials are suitable for use in fabricating the segments 10 of the present invention such for example as various plastics, rubber or the like. In the preferred embodiment of the present invention, polyvinyl chloride plastic material is the most desired. The segment terminates at one end in a male connector structure 14 and at the opposite end in a female connector structure 16. The vehicle guiding element is constructed by interconnecting a plurality of segments 10 together by inserting the male connector 14 into the female connector 16 of the next adjacent segment. Depressions 18 and 20 are formed on opposite sides of the body 12 and functioned as tracks to receive the wheels on a vehicle such as a toy train. The depressions 18 and 20 define sidewalls 22 and 24 to assist in retaining a toy vehicle on the tracks 18 and 20.

The tracks 18 and 20 are also defined on the interior of the body 12 by the walls 26 and 28 which cooperate in conjunction with the walls 24 and 22 to assist in guiding the vehicle along the track.

[0008] The segment 10 is designed so that it can be twisted about the x axis to cause the tracks to rotate. In addition, the segment 10 may be bent about the v axis thereby developing curves for the vehicle to traverse. The segment 10 may also be bent about the y axis to provide hills for the vehicle to traverse. Obviously, the segment 10 may be simultaneously bent about each of the axis x, y and z to thus provide a tortious(?) path for the vehicle to follow thus imparting more enjoyment to the user of the vehicle guiding element by way of allowing the vehicle on the track to not only turn corners but for allowing it to climb or descend in a spiral fashion.

[0009] By referring now more particularly to Figures 2 through 6, greater details of construction are illustrated to allow bending about the z axis a plurality of indentations 30 are provided along the outer edge 32 on one side of the body 12 and indentations 34 are provided on the opposite side 36 of the body 12. As is shown in greater detail in Figure 4, the indentations 34 are triangular in shape and terminate inwardly at a round relief cut 38. The triangular-shaped indentations 34 and 30 formed along each of the opposite sides 32 and 36 respectively of the body 12 will readily permit bending of the segment 10 about the z axis to

provide a curvature for the track. The amount of bending will be limited by the walls 40 and 42 defining a triangular indentation coming together.

As seen more particularly in Figure 6, there are a plurality of voids 42 to 44 provided along the under or bottom side of the segment 10. The voids are more clearly shown in Figure 3. The voids provide a minimization of the use of plastic in the formation of the segments and at the same time keep the walls defining the indentations 30-34 of similar thickness throughout the process.

[0010] As is seen more clearly in Figure 3, a central rib 46 that extends substantially the entire length of the segment 10 is provided. Encased within the rib 46 is a ductile metal member which allows the segment to be bent about the x, y and z axes and since the metal ductile member has no elasticity the particular position the segment is placed in will remain until it is changed by the user. The metal ductile member may take many forms but as shown in Figure 3 is a twisted pair 48 of wires. These wires can take various forms but in accordance with the preferred embodiment of the present invention. The wires are 14 gauge and approximately 11 to 12 twists per foot are provided therein. During molding of the segment 10 the twisted pair of wires 48 are disposed within the mold upon support tooling. When the elastomeric material such as the polyvinyl chloride plastic is injected into the mold it will completely encase the twisted pair of wire 48 and be in direct contact and will surround the twisted pair along the entire length thereof. When the molded segment 10 is removed from the mold, a plurality of openings as shown for example at 50 are provided along the rib 46 which are formed by the support to holding the twisted pair of wire 48.

[0011] As is shown more particularly in Figure 5, the female connector portion is provided with small ridges 52 extending along the inner edge thereof. The male connector also divides ridges 55 extending along the inner edge thereof. The ridges enhanced the friction fit between the male and female connector elements to assist in retaining joined sections or segments of the vehicle guiding element together irrespective of the twists and turns which are imparted thereto by the user. It has also been found that these small ridges providing on both male and female connector elements of the segment 10 functioned to allow the flexible vehicle guiding element of the present invention to easily mate with segments or sections of wooden type tracks presently on the market thereby providing a more universal use of the flexible segments constructed in accordance with the principles of the present invention.

[0012] Referring now more particularly to Figure 7, there is illustrated one end 56 of a segment 10 constructed in accordance with the principles of the present invention and including a male connector element 58 having the ridges 60 along one end thereof. Also shown is a section 62 of a second segment 10 which utilizes and defines the female connector 64 having ridges 66 along one edge thereof. When the ends 56 and 62 of a segments 10 are brought together and the male connector 58 is inserted into the female connector 64, the ridges on each are offset in such a fashion that they will not interfere with the mating of the male and female connectors but at the same time will enhance the friction connection to assist in holding the adjacent segments together.

[0013] As shown in Figure 8, a section 68 of a segment 10 having a male connector 70 associated therewith has been inserted into a female connector 72 of a prior art section 74 of track. The construction of the male connector 70 is such that it will readily connect into the female connector on the prior art track section and because of the ridges will maintain a good frictional engagement therewith.

Referring now to Figure 9, there is illustrated a similar arrangement where a section 76 of a prior art track section having a male connector 78 is inserted into a female connector 80 of a section 82 of a flexible vehicular guiding element constructed in accordance with the present invention. Again, the ridges formed by the female connector 82 provide good frictional engagement with the male connector 78 of a prior art track section 76.

[0014] Figure 10 illustrates the manner in which a track section 84 constructed in accordance with the principles of the present invention may be twisted and bent so that it starts from an elevated position shown generally at 86 and descends in a downwardly spiraling manner to a lower elevation 88.

As is illustrated in Figure 11, a flexible vehicle guiding element 90 may be formed so that two sections of track merged or may be utilized as a switch or the like. The construction of each of the segments 92 and 94 as illustrated to form the merged section 90 are constructed in the same manner as described above to provide flexibility in the x, y and z axes so that other segments may be joined to the male and female connectors as illustrated in Figure 11 to provide a continuous track upon which the vehicle may travel.

[0015] As shown in Figures 12 through 15, the ductile metal member may take various forms other than a twisted pair and the segments may be formed having various geometric shapes. For example, in Figure 12, the ductile metal member 96 may be

rectangular in cross section. In Figure 13, the member 98 may be a single circular wire-shaped member, in Figure 14, the ductile member may be square in shape as shown at 100 and in Figure 15, the member may comprise two separate square members 102 and 104. In each instance, the members are completely surrounded and encased within the molded elastomeric material which is in direct contact therewith along the entire length of the ductile metal member irrespective of its shape.

[0016] It has been found on some occasions that when the vehicle guiding element constructed in accordance with the present invention is rotated particularly about the y axis in such a manner that a substantial amount of stress is placed upon the connectors that they can become displaced. To preclude this occurring a connector support member 110 as shown in Figure 16 may be provided. The member 110 has a plurality of protrusions 112 extending from the upper surface 114 thereof. The protrusions 112 are structured to fit within voids 116 on the female connector end portion 118 of a segment 120 of the vehicle guiding element as shown in Figure 17. The element 110 is shown so placed in Figure 18. It will be noted that the upper surface 122 of the element is flat so that when the element is stored on the connector end 118 and the segment 120 is turned over so that the track is on the upper surface thereof as shown in Figure 19. The segment 120 will lie flat upon the surface.

[0017] However, if the element 110 is needed to provide additional strength in the connection between two adjacent and continuing segments it can be removed from the cavities 116 so that one half thereof extends outwardly as shown at 124 in Figure 20. In this position, the next adjacent segment of the vehicle guiding element containing the male connector can be brought into play with the male connector inserted into the female connector 126. The end of the segment containing the male connector includes cavities similar to those shown at 116 thus allowing the protrusions 112 extending outwardly on the section 124 to be seated within the undersurface of the region carrying the male connector. By utilizing a structure such as this, not only will the frictional engagement between the male and female connectors hold the two segments together but the element 110 which now interconnects the two segments will provide additional strength to the interconnection to prevent any separation when the track is manipulated about the wire axes.

[0018] It will be understood that the vehicle guiding elements described above may find useful applications and other types of constructions differing from the types described above.

[0019] While the invention has been illustrated and described as embodied in a guiding element for a toy vehicle, it is not intended to be limited to the details shown since

various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will fully reveal the principle to the present invention in a manner such that other stand by applying current knowledge readily adopted for various applications without omitting features that from the standpoint of prior art fairly constitutes essential characteristics of the generic or specific aspects of the invention.